Vehicle Financing Performance Dashboard for Automotive Finance

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ABSTRACT

This project focuses on creating a performance dashboard for the automotive finance sector, addressing the problem of fragmented data and inefficient portfolio management. The dashboard integrates data from a comprehensive source, providing a unified platform for financial analysis and visualization. Using Power BI for interactive visualizations and Excel for data manipulation, the project streamlines portfolio management, allowing finance professionals to track key metrics like loan origination trends, delinquency rates, and portfolio growth. The dashboard's interactive features and real-time analytics support effective risk management by enabling users to assess credit risk and identify high-risk accounts, reducing the likelihood of loan defaults. The benchmarking capabilities allow automotive finance companies to compare their performance with industry peers, facilitating strategic planning and performance evaluation. By providing insights into portfolio health and operational efficiency, the project aims to set a new standard for business intelligence in the automotive finance sector. The project's key findings suggest that a unified platform can enhance data-driven decision-making, improve operational workflows, and offer a competitive edge in a rapidly evolving industry.

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CHAPTER 1: INTRODUCTION

1.1 Project Introduction

Vehicle financing is a fundamental aspect of the automotive industry, enabling consumers to purchase vehicles through financial products such as loans and leases. However, automotive finance companies often struggle with fragmented data, limited visibility into key metrics, and a lack of integrated tools for effective portfolio management. This results in challenges like difficulty in assessing loan delinquency rates, limited tracking of loan origination trends, and inadequate risk management.

1.1.1 Project Context

This project aims to address these gaps by developing a performance dashboard tailored for automotive finance companies. The dashboard provides a comprehensive view of key metrics like loan delinquency rates, loan origination trends, and overall profitability. It integrates data from various sources to offer finance professionals a holistic perspective, facilitating informed decision-making and enhancing portfolio management.

1.1.2 Objectives of the Study

The main objective of this study is to create a unified platform for managing complex financial data and supporting swift, accurate analysis. The dashboard's interactive features contribute to effective risk management by allowing finance professionals to assess credit risk, track delinquency rates, and identify high-risk accounts for proactive risk mitigation.

1.1.2.1 Primary Objectives

- Interactive Visualizations : Provide real-time analytics and interactive visualizations to support data-driven decision-making and operational efficiency.
- Portfolio Management : Offer finance professionals the tools to streamline portfolio management, reducing errors and saving time.
- Risk Management : Enable assessment of credit risk, tracking of delinquency rates, and identification of high-risk accounts, reducing the likelihood of loan defaults.

1.1.2.2 Secondary Objectives

- Competitive Advantage : Provide a competitive edge by enabling companies to adapt to changing market conditions and stay ahead of competitors.
- Benchmarking : Support strategic planning and performance evaluation by allowing automotive finance companies to compare their performance with industry peers.
- Portfolio Health : Promote a proactive approach to portfolio health, enhancing operational workflows and facilitating effective risk management.

1.2 Background and Related Works

The automotive finance industry has undergone significant transformation due to changing consumer behaviour and innovative financial products.

1.2.1 Evolution of the Automotive Finance Industry

Traditional systems often focus on basic loan management, lacking advanced analytics or predictive capabilities. This limitation leads to fragmented data, inefficient portfolio management, and challenges in gaining deeper insights into financial operations. Several studies have identified these issues and proposed solutions to overcome them.

1.2.2 Previous Projects and Studies

We have examined a range of relevant papers to gain insights into the automotive finance sector and observed several key trends and approaches that have informed our project. Here's an overview of these observations:

1.2.2.1 Power BI-Based Performance Dashboard

A project from Indonesia, it examined the deployment of a performance dashboard using Power BI to address similar challenges. The project, linked to Indomobil, Indonesia's largest automotive company, developed a dashboard system integrating data from different sources to enable advanced analytics and business intelligence. It emphasized the importance of data cleansing, user involvement from the analysis stage to the result validation, and cloud-based technologies to support business intelligence.

1.2.2.2 Impact of COVID-19 on Indian Automobile Industry

Another study explored the impact of COVID-19 on the Indian automobile industry, analyzing factors like factory closures, supply chain disruptions, and a collapse in demand. It reviewed the financial performance of leading Indian automobile companies such as Bajaj Auto Limited and Tata Motors Limited, focusing on metrics like Enterprise Value, Capitalization/Revenue Ratio, Price Earnings Ratio, and Enterprise Value/EBDITA. The findings underscored the need for innovative strategies and restructuring in response to the pandemic's effects.

1.2.2.3 Additional Research on the Automotive Finance Industry

Various research projects have delved into other dimensions of the automotive finance industry. A study conducted a SWOT analysis of the Indian automobile industry, highlighting that demand for vehicles depends on factors like convenience, cost of finance, and demographic trends. It suggested continuous innovation and technological development to stay competitive during economic slowdowns. Another study examined the environmental impact of the automotive sector, focusing on industry growth and its relationship with air pollution.

1.2.3 Application to the Current Project

The proposed performance dashboard aims to address the shortcomings of traditional systems by integrating diverse data sources, offering real-time analytics, and providing interactive visualizations. By leveraging tools like Power BI, the project aims to reduce data fragmentation and enable deeper insights into vehicle financing portfolios. This unified platform supports advanced analytics, allowing automotive finance companies to track key metrics, identify trends, and make data-driven decisions. With a focus on operational efficiency, risk reduction, and competitive advantage, the dashboard represents a significant step toward a more informed approach to portfolio management and sets a new standard for business intelligence in the automotive finance sector.

1.3 Key Terminology and Concepts

i. Loan delinquency: This term refers to a borrower's failure to meet loan payment obligations within the agreed timeframe. It is a critical metric in assessing loan performance and credit risk. A high delinquency rate may indicate potential issues with credit policies or borrower screening processes. *ii. Portfolio management:* This involves overseeing a collection of financial assets, primarily vehicle loans, to maximize returns and minimize risk. The dashboard allows finance professionals to track key portfolio metrics and identify trends affecting overall portfolio health.

iii. *Net interest margin:* This measures profitability by calculating the difference between interest earned on assets (loans) and interest paid on liabilities. A positive net interest margin indicates that a company's loan operations are profitable.

iv. *Credit risk:* This represents the likelihood of a borrower defaulting on a loan. A higher credit risk often correlates with a greater chance of loan defaults, impacting the overall financial stability of an automotive finance company.

v. *Loan-to-Value (LTV) ratio:* This ratio indicates the relationship between a loan amount and the value of the asset being financed. A higher LTV ratio suggests a greater risk, as the loan amount is closer to the asset's value, while a lower LTV ratio indicates a more secure loan.

vi. *Credit score range:* Credit scores reflect a borrower's creditworthiness, with higher scores indicating lower risk. The dashboard may categorize borrowers into credit score ranges such as "Excellent," "Good," "Average," and "Poor," helping finance professionals evaluate borrower risk profiles.

vii. *Employment type:* This attribute differentiates borrowers based on their employment status, whether "Salaried" or "Self-employed." It can impact loan approval rates, as salaried individuals often have a more stable income source compared to self-employed borrowers.

viii. *Loan default:* This occurs when a borrower fails to repay a loan, resulting in a complete loss for the lender. Tracking default rates provides insights into overall portfolio health and risk exposure. *ix. Disbursal amount:* This indicates the total amount disbursed for vehicle financing. The dashboard can show disbursal trends by manufacturer or time period, offering insights into market demand and loan origination trends.

x. *Average account age*: This refers to the average duration of accounts within a portfolio. It can help assess the longevity and stability of loan accounts.

xi. *Delinquency rate*: This measures the proportion of delinquent loans within a given portfolio. A rising delinquency rate may signal a need for more stringent risk management.

xii. *Loan portfolio:* A loan portfolio is the totality of the loans issued by a bank or a financial institution to its customers.

xiii. *Portfolio growth rate:* This indicates the rate at which a portfolio is growing, reflecting overall business expansion. A higher growth rate can suggest strong market demand and successful loan origination strategies.

xiv. *Default rate:* This represents the percentage of loans that result in defaults. It provides a clear indication of portfolio risk and helps finance professionals identify areas for risk mitigation.

These terms and concepts form the foundation for evaluating and managing an automotive finance portfolio. By analyzing these metrics, the performance dashboard provides finance professionals with the tools to make data-driven decisions, optimize portfolio management, and mitigate risks.

1.4 Outline of the Report

This report on the development of a performance dashboard for the automotive finance sector is structured into five chapters. Chapter 1 introduces the project, emphasizing its role in addressing fragmented data in the industry and discussing how vehicle financing through loans and leases sets the stage for a unified platform. Chapter 2 explores the project overview and objectives, focusing on a unified approach to managing financial data by integrating information from loan management systems, customer databases,

and credit bureaus. Chapter 3 outlines the methodology, detailing a multi-stage approach that involves data integration, preprocessing, and visualization. It describes how Excel is used for data manipulation and Power BI for interactive visualizations, stressing data quality for accurate insights. Chapter 4 discusses the results and key metrics such as loan delinquency rates, portfolio growth, and credit risk. It explains how these metrics support portfolio management and operational efficiency, with real-time analysis and interactive features. Chapter 5 concludes the report with a summary of findings and future recommendations. It highlights areas for further research and emphasizes the benefits of the performance dashboard, including improved decision-making and portfolio management, setting a new standard for business intelligence in the automotive finance sector.

CHAPTER 2: PROJECT OVERVIEW AND OBJECTIVES

2.1 Summary of Background Works

The summary of background works encapsulates the project's objectives, methodology, and the strategic use of business intelligence tools to address the challenges faced by the automotive finance sector. The primary drivers for this dashboard include the need to manage complex financial data, optimize operations, and mitigate risk.

2.1.1 Business Intelligence Tools

The application of business intelligence (BI) tools like Power BI plays a central role in this project. Power BI's capability to manage large datasets and create interactive dashboards is critical for real-time analytics and visualization. The project uses Excel for initial data processing and Power BI for advanced visualizations, enabling finance professionals to explore critical metrics and trends. The project's objective is to facilitate data-driven decision-making in the automotive finance sector, focusing on operational efficiency and portfolio risk management.

2.1.2 Portfolio Risk Analysis

A major focus of this project is on portfolio risk analysis. The dashboard helps finance professionals assess loan performance, identify high-risk accounts, and implement risk mitigation strategies. The analysis includes metrics like credit score bands, loan-to-value ratios, and delinquency rates. While the project uses Power BI for interactive visualizations, the advanced analytics are kept simple, allowing users to focus on key metrics and trends without the complexity of cloud-based solutions or extensive predictive analytics.

2.1.3 Comparative Benchmarking

The dashboard also provides comparative benchmarking, allowing automotive finance companies to evaluate the competitiveness of their loan terms, pricing strategies, and portfolio growth rates. This comparative analysis supports strategic planning and performance evaluation, helping companies make informed decisions to maintain profitability and reduce risk. The benchmarking capabilities enable companies to assess their position within the industry and adjust strategies to stay competitive.

2.1.4 Overall Objectives

Overall, the performance dashboard aims to streamline operations, enhance portfolio management, and improve risk mitigation in the automotive finance sector. By utilizing Power BI and Excel, the project creates a comprehensive tool for managing vehicle financing portfolios, offering finance professionals the insights they need to drive data-driven decision-making and achieve operational efficiency.

2.2 Problem Statement and Identified Gaps

The automotive finance sector faces significant challenges in consolidating and analyzing diverse data sources, leading to fragmented insights and inefficient portfolio management. Traditional systems often focus on basic loan management without providing advanced analytics or predictive capabilities, resulting in limited visibility into key metrics such as loan delinquency rates, default rates, and profitability. This fragmentation creates gaps in understanding the overall health of vehicle financing portfolios, hindering data-driven decision-making.

Additionally, companies struggle to implement effective portfolio risk analysis due to the lack of integrated tools that can assess and segment loans by risk categories, such as credit score bands and loan-to-value ratios. These identified gaps suggest a need for a comprehensive performance dashboard that provides a unified view of key financial metrics, supports advanced analytics, and enables real-time monitoring of portfolio performance. This problem statement forms the basis for developing a tailored dashboard designed to address these issues, providing the tools necessary to optimize lending strategies and improve profitability.

2.3 Aim and Objectives

2.3.1 Aim

The primary aim of this project is to create an intuitive and interactive performance dashboard that offers insights into vehicle financing portfolios, supporting data-driven decision-making and effective portfolio management.

2.3.2 Objectives

To achieve this aim, the project sets out several key objectives:

   i. Data integration: Integrate data from a comprehensive source to create a unified dataset for analysis. This integration provides a solid foundation for subsequent analytics and visualization. *ii. Key metric visualization:* Design visualizations to display key performance metrics, such as loan origination volumes, delinquency rates, and profitability indicators (e.g., net interest margin, return on assets). These visualizations are interactive and intuitive, enabling stakeholders to make informed decisions quickly.

iii.   *Portfolio risk analysis:* Implement analytics tools to segment loans by various risk categories, allowing finance professionals to identify high-risk accounts and develop proactive risk management strategies. This objective supports a more granular understanding of portfolio risks, leading to improved portfolio health.

iv.   *Trend analysis and forecasting:* Conduct trend analysis and forecasting to predict future loan delinquency rates and assess portfolio growth trajectories. This predictive approach aims to provide insights that support strategic planning and adaptation to market dynamics.

v.   *Comparative benchmarking:* Enable benchmarking against industry peers and market benchmarks to evaluate the competitiveness of loan terms, pricing strategies, and risk-adjusted returns. This benchmarking supports strategic decision-making and performance evaluation, helping companies stay competitive and profitable.

2.4 Significance and Relevance

The significance of this project lies in its potential to revolutionize how automotive finance companies make data-driven decisions. By providing a comprehensive tool for monitoring and analyzing vehicle financing portfolios, the dashboard addresses the identified gaps in current systems and supports more effective portfolio management. This project is relevant to the financial services domain, where companies face increasing pressure to optimize lending practices and manage risk proactively.

The project's relevance is underscored by its ability to facilitate data-driven decision-making, improve operational efficiency, and reduce risk. The dashboard's integration of a comprehensive data source and analytical tools ensures that finance professionals have access to accurate and reliable insights, allowing them to adapt to changing market conditions and regulatory trends. By enabling comparative benchmarking and trend analysis, the project provides a competitive advantage, supporting strategic planning and enhancing profitability in the automotive finance sector.

Ultimately, this project aims to set new standards for business intelligence in the automotive finance industry, offering a modern approach to data analysis and portfolio management. Its significance extends to stakeholders across the sector, providing them with the tools and insights needed to navigate the complexities of vehicle financing successfully.

2.5 Report Structure

The structure of this report is designed to guide readers through the project's development process. Chapter 1 provides an introduction and context. Chapter 2 discusses the project overview and objectives, emphasizing the need for a unified approach to managing financial data in automotive finance. Chapter 3 outlines the methodology, including data processing and visualization. Chapter 4 presents the project's results and their interpretation. Finally, Chapter 5 offers conclusions and future recommendations. This structure allows for a comprehensive examination of the project's development and results, leading to actionable insights for automotive finance companies.

CHAPTER 3: PROJECT METHODOLOGY

3.1 Research Methodology

The research methodology for this project focuses on developing a performance dashboard for automotive finance companies, emphasizing data integration, analytical precision, and interactive visualization. It starts with comprehensive data collection and proceeds to robust data processing to create a dataset suitable for analysis in Power BI. The use of Excel and Power BI helps to transform complex data into meaningful insights for effective portfolio management.

3.1.1 Data Processing

This involves several steps to ensure data quality and consistency. These include:

- Data Cleaning : Removing duplicate records, addressing missing values through methods like median imputation, and correcting inconsistencies in data formats.
- Data Transformation : Normalizing data to ensure uniformity across all fields, converting data into usable forms for analysis, and creating new calculated fields for specific insights.
- Data Manipulation : Using Excel and Power BI's functions to create pivot tables, segment data, and generate calculated fields to aid in visualization.

Using a tool like Power BI, statistical analysis can be done which includes calculating averages, counts, maxima, minima, and sums for various fields. This step helps understand the distribution of data and identify key metrics.

3.1.2 Visualization Techniques

Once the dataset is prepared, visualization techniques are applied to extract insights and identify trends. Power BI enables the design of interactive visualizations, including bar charts, pie charts, scatter plots, and trend lines, to represent key metrics like loan approval rates, portfolio growth rates, and default rates.

3.1.1 Portfolio Risk Analysis

This is another crucial step in the methodology, allowing finance professionals to predict loan defaults and segment loans by risk categories. This analysis uses various contributing factors to identify high-risk accounts and develop proactive risk management strategies.

3.1.1 Validation and Testing

These are critical to ensure the reliability and accuracy of the data and the performance dashboard. This involves:

- Data Validation : Cross-checking data against known benchmarks to ensure consistency and reliability.
- Dashboard Testing : Testing the performance dashboard for functionality, usability, and responsiveness.

Overall, the research methodology encompasses a comprehensive approach to data integration, processing, analytics, and visualization. The goal is to create a performance dashboard that provides automotive finance companies with insights for data-driven decision-making, effective portfolio management, and optimized lending strategies.

3.2 Data Collection and Processing

Data collection and processing form the backbone of this project, providing the information needed to create a comprehensive performance dashboard for the automotive finance sector.

3.2.1 Data Collection

The primary data source is L&T Finances, with 3,45,546 entries containing a wide range of metrics related to vehicle financing. The dataset includes fields such as `loan_default`, `disbursed_amount`, `asset_cost`, and `ltv`, which pertain to loan information. It also contains customer demographic information like `Employment.Type`, `Date.of.Birth`, `State_ID`, `Current_pincode`, and `MobileNo_Avl_Flag`. The dataset further encompasses portfolio-related metrics like `PRI.NO.OF.ACCTS`, `PRI.ACTIVE.ACCTS`, `SEC.NO.OF.ACCTS`, and `SEC.ACTIVE.ACCTS`. This comprehensive dataset serves as the foundation for analysis and visualization in the performance dashboard. **3.2.2 Data Processing and Transformation:**

To prepare the data for analysis, the initial process involves:

- Data Cleaning: Handling missing or redundant values, removing outliers, and normalizing the data to ensure consistency.
- Data Transformation: Using Power BI's DAX (Data Analysis Expressions) to create custom measures and calculate derived metrics.
- Data Manipulation: Leveraging Excel and Power BI to create pivot tables, segment data, and generate calculated fields.

The following transformations were applied:

i. *Average Delinquency Rate :* calculates the average delinquency rate across the dataset, providing insights into the general health of the loan portfolio.

Avg Delinquency Rate =
AVERAGE('Dataset'[Delinquency Rate])

ii. *Bad Accounts :* This measure aggregates delinquent accounts, combining sums from different sources to identify total bad accounts.

Bad Accounts =
SUM('Dataset'[DELINQUENT.ACCTS.IN.LAST.SIX.MONTHS]) +
SUM('Dataset'[PRI.OVERDUE.ACCTS]) + CALCULATE(SUM('Dataset'[loan_default]),
FILTER('Dataset','Dataset'[loan_default]=1))

iii. *Charge-Off Rate :* This measure divides the total loss accounts by the total loan amount, giving an indication of charge-off risk.
Charge Off Rate =
VAR LossActs = CALCULATE(SUM('Dataset'[disbursed_amount]),
FILTER('Dataset','Dataset'[loan_default] = 1),
FILTER('Dataset','Dataset'[Delinquency Rate] > 0.6))
VAR Totalloan = SUM('Dataset'[disbursed_amount])
RETURN DIVIDE(LossActs,Totalloan)

iv. *Eligibility for Future Loans :* This measure uses conditions based on credit score ranges and identification flags to determine if customers are eligible for future loans.

Eligibility For Future Loans =
CALCULATE(COUNTROWS('Dataset'),
FILTER('Dataset', 'Dataset'[Credit Score Range] in {"Average","Good","Excellent"}),
FILTER('Dataset','Dataset'[Aadhar_flag]+'Dataset'[Driving_flag]+'Dataset'[Passport_flag]+'Dataset'[VoterID_flag] > 0))

v. *Loan Approval Rate :* A calculated measure based on the ratio of non-delinquent, non-overdue, and non-defaulted loans to the total number of loans.

Loan Approval Rate =
VAR TotalCustomers = COUNTROWS('Dataset')
VAR DELINQUENT =
CALCULATE(COUNTROWS('Dataset'),'Dataset'[DELINQUENT.ACCTS.IN.LAST.SIX.MONTHS] > 0)
VAR Overdue = CALCULATE(COUNTROWS('Dataset'),
'Dataset'[PRI.OVERDUE.ACCTS]>0)
VAR Default = CALCULATE(COUNTROWS('Dataset'), 'Dataset'[loan_default] = 1)
RETURN DIVIDE(TotalCustomers – Default – DELINQUENT – Overdue,

TotalCustomers) vi. Number of Applicants in Huge Debt :

No of Applicants in Huge Debt =
CALCULATE(COUNTROWS('Dataset'), FILTER('Dataset','Dataset'[DTI
Ratio] > 0.72))

vii. Portfolio Growth Rate : This measure determines the growth rate over time by comparing beginning and ending disbursed amounts.

Portfolio Growth Rate =
VAR Beginning =
CALCULATE(SUM('Dataset'[disbursed_amount]),
FILTER('Dataset','Dataset'[Disbursal Date] = DATE(2021, 8, 1)))
VAR Ending =CALCULATE(SUM('Dataset'[disbursed_amount]),
FILTER('Dataset','Dataset'[Disbursal Date] = DATE(2021, 10, 31)))
RETURN POWER(DIVIDE(Ending-Beginning,Beginning),0.33)
− 1

viii. Portfolio Yield : This measure divides the sum of net interest by the total disbursed amount, providing a profitability metric.

Portfolio Yield % =
DIVIDE(SUM('Dataset'[Net Interest Per Customer]),
SUM('Dataset'[disbursed_amount]))

3.2.3 Data Preparation for Visualization

Once the data was processed, it was prepared for visualization in Power BI. This step involved creating various measures, including counts, averages, maximums, minimums, and sums, to facilitate detailed analysis and dashboard creation. The following measures were prepared:

'asset_cost', 'DELINQUENT.ACCTS.IN.LAST.SIX.MONTHS', 'disbursed amount', 'loan default', 'NEW.ACCTS.IN.LAST.SIX.MONTHS',   'NO.OF_INQUIRIES', 'PRI.ACTIVE.ACCTS', 'PRI.CURRENT.BALANCE',   'PRI.DISBURSED.AMOUNT',   'PRI.NO.OF.ACCTS', 'PRI.OVERDUE.ACCTS', and 'PRI.SANCTIONED.AMOUNT'.

By preparing the dataset with these measures, the project created an interactive performance dashboard providing detailed insights into the automotive finance sector.

3.3 Tools and Technologies

The tools and technologies used in this project are central to creating a performance dashboard for the automotive finance sector. Power BI and Excel are the key platforms, providing a comprehensive environment for data analysis, visualization, and business intelligence.

3.3.1 Power BI

- A business intelligence platform known for its interactive reports and dashboards, offering key features such as:
- Interactive Visualizations : A wide range of visualizations, including bar charts, pie charts, scatter plots, and trend lines, essential for exploring key metrics and trends.
- Data Integration : Tools for data integration and transformation, enabling users to clean, filter, and normalize data.
- Real-Time Analytics : Power BI's real-time analytics allow users to track changes in the data and update visualizations dynamically, supporting informed decision-making and operational efficiency.

- Custom Measures and Calculations : Power BI's DAX (Data Analysis Expressions) allows for the creation of custom measures and specific metrics for deeper insights.
- Drill-Down Functionality : Provides users with the ability to explore data at various levels, offering deeper insights into specific metrics.

3.3.2 Excel

- Used for initial data manipulation and preprocessing, with key features like:
- Data Cleaning and Processing : Excel's functions enable cleaning, handling missing values, and normalizing data, ensuring accuracy before importing into Power BI.
- Statistical Analysis : Excel supports basic statistical analysis, allowing for calculating averages, sums, counts, and other measures.
- Data Manipulation : Excel's ability to create pivot tables and perform complex calculations is invaluable for data preparation and preliminary analysis.

Together, these tools offer a robust framework for data analysis and visualization, enabling seamless integration with Power BI to support the project's goals.

3.4 Experimental Design or Data Sources

3.4.1 Data Sources

As mentioned in section 3.2.1, the dashboard is constructed in Power BI using a dataset from L&T Finances, containing 3,45,546 entries providing a broad spectrum of information, including financial metrics such as `disbursed_amount`, `asset_cost`, `ltv`, and `loan_default`. Additionally, the dataset encompasses customer demographics like `Employment.Type`, `Date.of.Birth`, and `State_ID`, giving a comprehensive view for analysis and segmentation.

Data Processing involves preparing the dataset for analysis in Power BI, which includes Data , Data Transformation, and Data Manipulation as explained in section 3.II of this report.

3.4.2 Design of the Dashboard

The design of the dashboard prioritizes user-friendliness and interactivity. Key visualizations include:

- Bar Charts and Pie Charts : Representing categorical data, such as `Employment.Type`, `loan_default`, and `Credit Score Range`.
- Line Charts and Scatter Plots : Showing relationships between variables and tracking trends over time, such as `Portfolio Yield %` and `Average Account Age`.
- Gauge Charts and Cards : Displaying specific metrics like `Sum of Net Interest Per Customer` and `Portfolio Growth Rate`.
- Slicers and Filters : Allowing users to explore data at various levels, providing a more detailed understanding and facilitating portfolio management.

The usability and user experience focus on intuitive design, with interactive elements like drill-down and filtering to allow users to customize their view and explore data from different angles. This comprehensive approach to data collection, processing, and visualization lays a solid foundation for the project's performance dashboard,offering finance professionals the tools they need to make data-driven decisions, manage portfolio risk, and optimize lending strategies.

CHAPTER 4: RESULTS AND DISCUSSIONS

4.1. Presentation of Project Results

4.1.1. Introduction

4.1.1.1. This line chart depicts the loan approval rate of the institution over the period of three months. Through this visualization, we can see that the loan approval rate remains almost constant throughout, with the median rate being 60%. A sharp increase in the loan approval rate was witnessed on October 2nd, 2021.
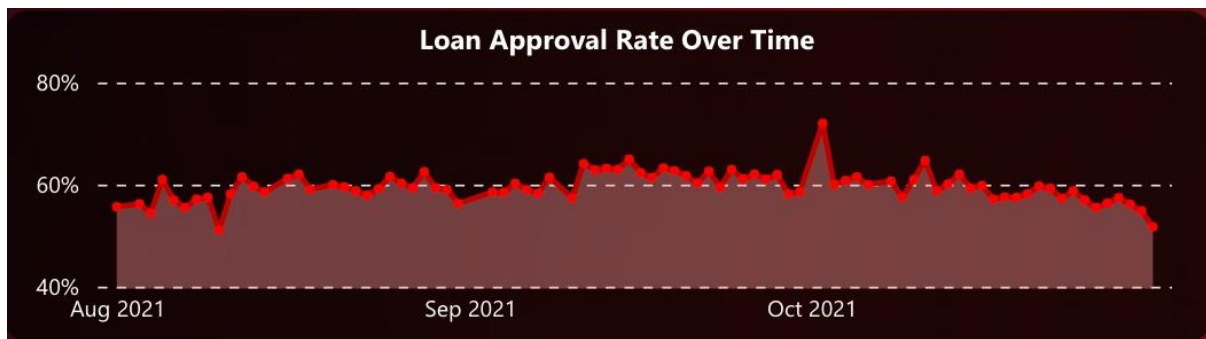

Figure 1: Loan Approval Rate over Time

4.1.1.2. This bar chart depicts the top manufacturers for whose vehicles the institution finances loans. Maruti Suzuki is the most popular car brand and has almost double the customers than Hyundai does, which comes at the second position.
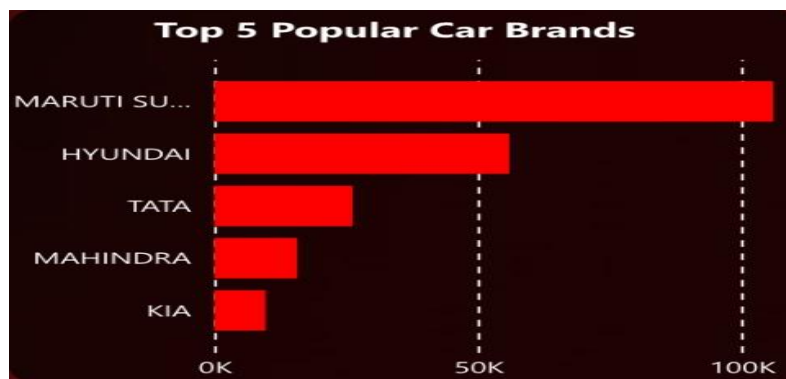

Figure 2: Top 5 Popular Car Brands

4.1.1.3. Key metrics:

i. Total no. of customers: 225K ii. No. of approved applications: 133K iii.
   Average default rate: 54.93% iv.
   Loan approval rate: 58.93%
v.   Portfolio growth rate: 65.67%

4.1.2. KPIs and Trends

4.1.2.1. This line graph shows the delinquency rate of customers who have either previously defaulted on a loan or not, spread over the loan tenure of the customer.
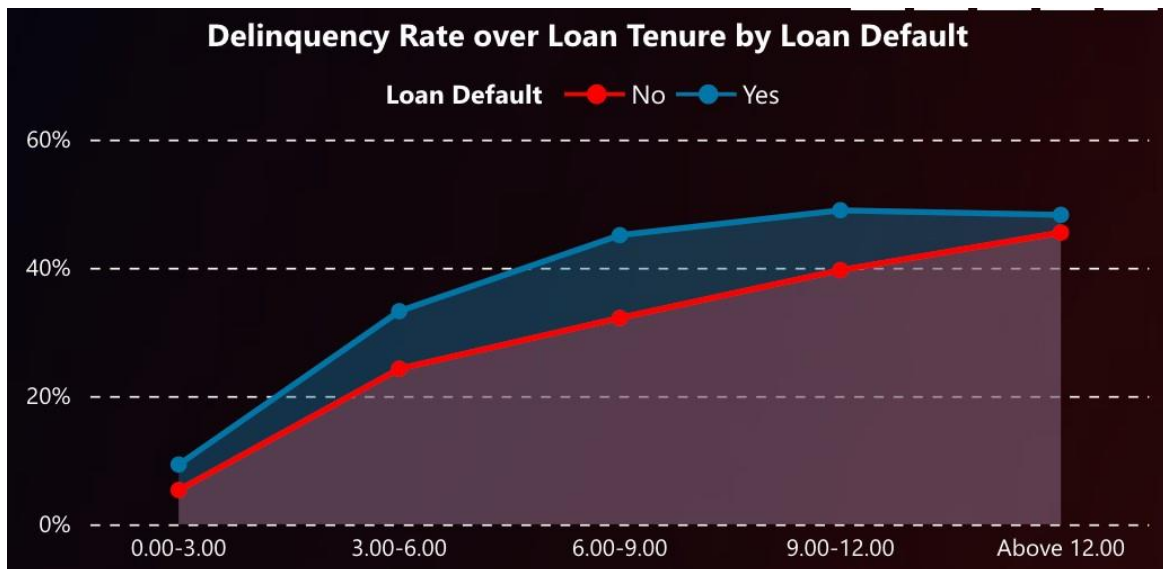

Figure 3: Delinquency Rate over Loan Tenure by Loan Default

4.1.2.2. The pie chart depicts the distribution of customers who are eligible for a future loan according to their age group.
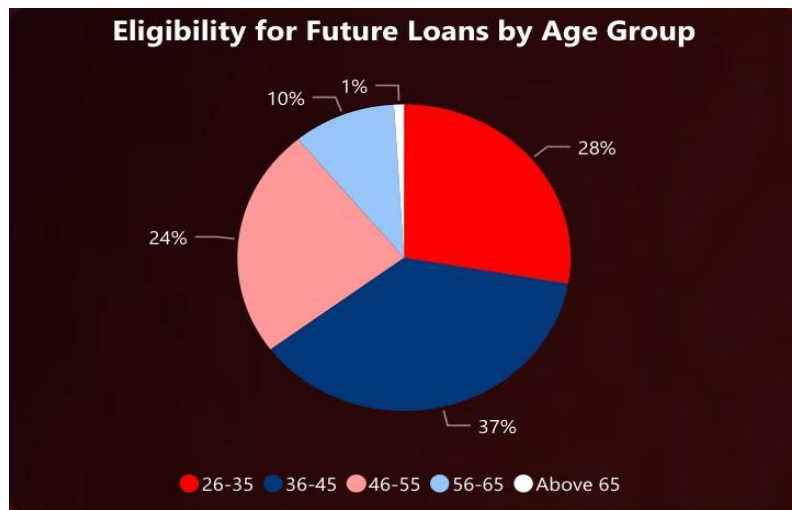

Figure 4: Eligibility for Future Loans by Age Group

4.1.2.3. This map represents the total amount of debt of customers according to their states residential status.
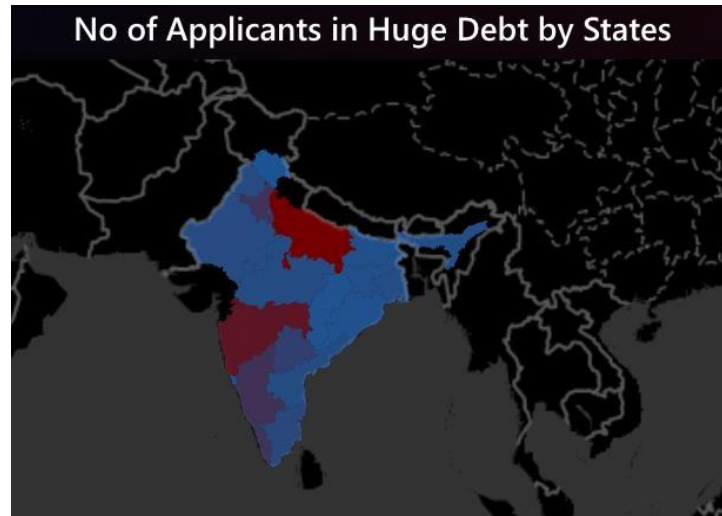

Figure 5: No. of Applicants in Huge Debt by States

4.1.2.4. This map represents the total number of accounts and the total number of active accounts over the credit history of customers.
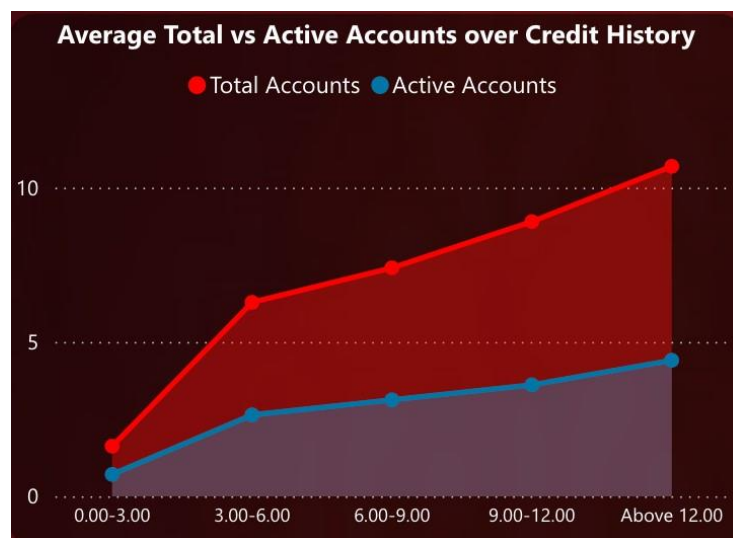

Figure 6: Average total vs. Active accounts over Credit History

4.1.3. Risk Analysis

4.1.3.1. This line-bar chart representing the number of customers without a valid identity proof that the institution approved loans for, and the maximum loan amount disbursed to such customers over the tenure of the loan.
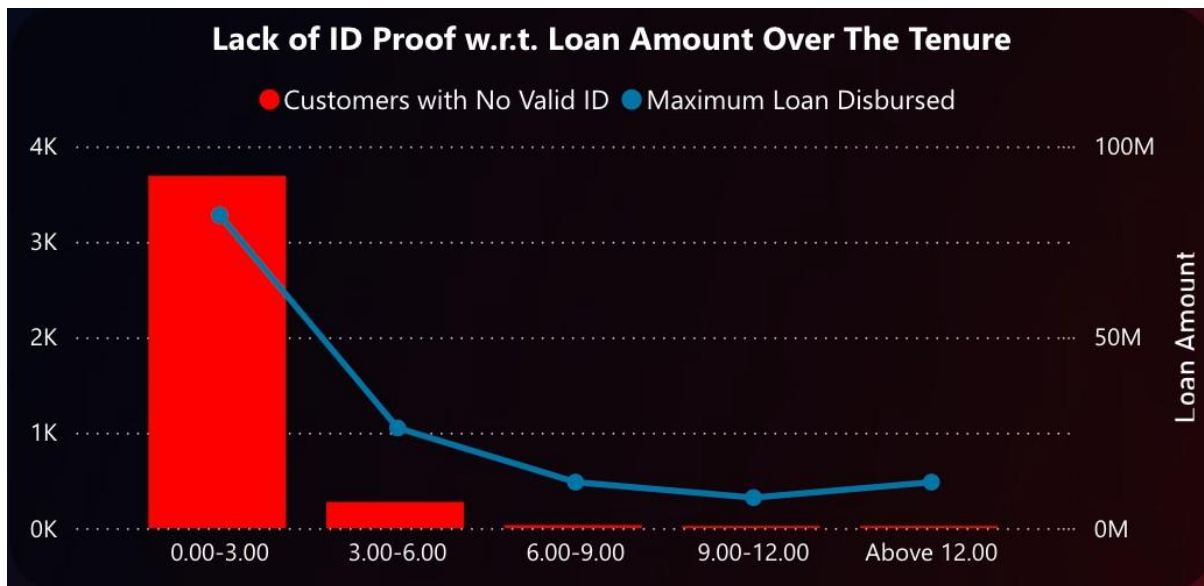
Figure 7: Lack of ID proof wrt Loan Amount over the Tenure

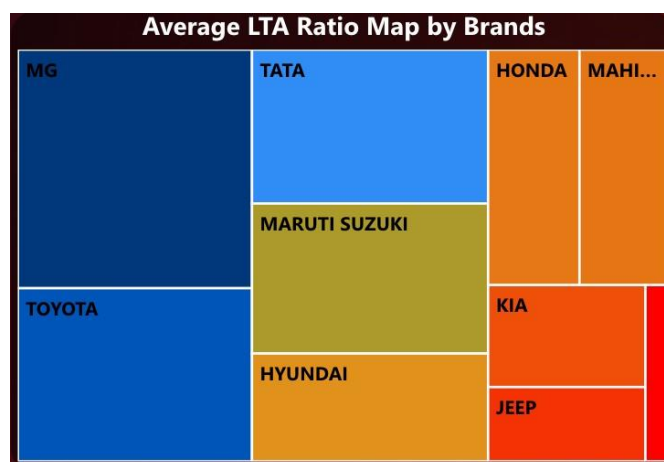**4.1.3.2.** This treemap tells us the LTA ratio of various manufacturers.

Figure 8: Average LTA ratio map by brands

4.1.3.3. This stacked bar graph shows us the proportion of all the good and bad accounts, based on whether the customers had previously defaulted on the loan.
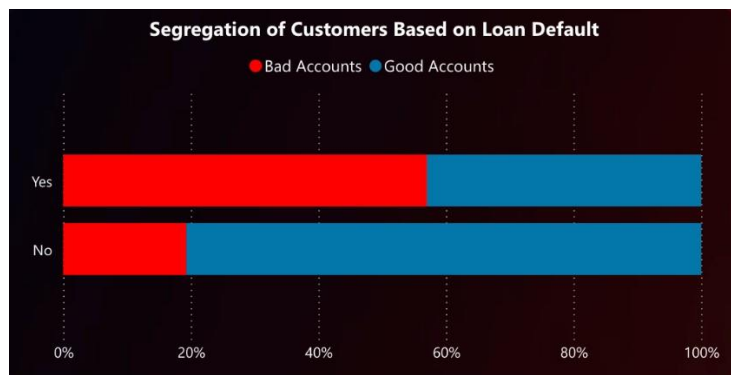

Figure 9: Segregation of customers based on loan default

4.1.3.4. This gauge tells us the average default rate versus the target default rate that the institution wants to reach.

Figure 10: Average vs Target default rate

4.1.3.5. These metrics quantify the risk faced by the institution:

Figure 11: Metrics that quantify risk

4.1.4. Benchmarking

4.1.4.1. The following gauge chart shows us the current profit made from the portfolio (144.66B) and the target profit to be reached (250B).
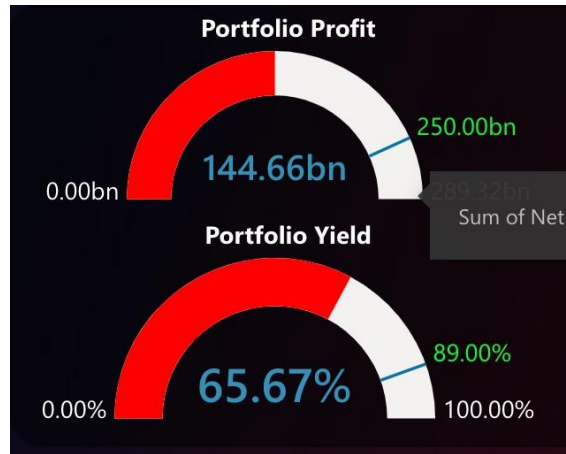

Figure 12: Portfolio profit and Portfolio yield

4.1.4.2. This line graph shows us the portfolio yield from August 2021 to October 2021. This allows us to compare the institution's current profit with the past performance.
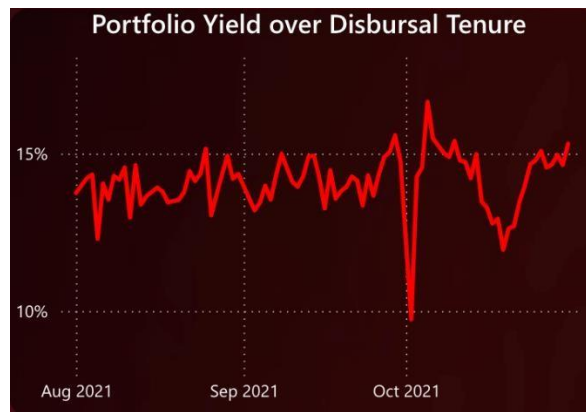
Figure 13: Portfolio yield over Disbursal Tenure

4.2. Interpretation of Findings

4.2.1. The loan approval rate stays nearly constant from August 2021 to October 2021 with a median value of 58.93%. This indicates stability and consistency in their lending practices.

4.2.2. The customers most frequently approved for loans fall in the age group of 36-45. This age group also had the highest number of customers eligible for future loans. Generally, individuals in the 3645 age group are likely to have stable careers and established financial backgrounds. They may have reached a point in their lives where they have steady incomes and a good credit history, making them attractive candidates for loans.

4.2.3. Utttar Pradesh and Maharashtra had the highest number of applicants who were already in huge debt. High levels of debt in specific states may raise concerns about the creditworthiness of borrowers residing in those states. The institution may need to conduct a more thorough risk assessment of borrowers from Uttar Pradesh and Maharashtra to mitigate the risk of defaults or delinquencies. Any adverse economic or political developments in these states could have a disproportionate impact on the finance company's financial performance.

4.2.4. People who did not default on the loans before had lower delinquency rates for each tenure length. It suggests that the previous default status of a borrower is a significant predictor of their likelihood to default again. The institution can use this information to refine its credit underwriting criteria, placing greater emphasis on factors such as credit history and past default behavior when evaluating loan applications. Loan pricing can be adjusted based on the borrower's credit risk profile. Borrowers with a history of previous defaults can be offered loans with higher interest rates or stricter terms to compensate for the increased risk of default.

4.2.5. We see that the majority of the customers without a valid identity proof only get loans approved for a very short tenure, 0-3 years. Because of the short tenure, they can also get a higher loan amount. Customers without a valid identity proof barely get long term (6-12 years) loans approved, and the disbursed amount is very less compared to loans given for shorter tenures.

4.3 Alignment with Problem Statement

In examining the insights gleaned from our comprehensive performance dashboard, it becomes evident that our findings align closely with the objectives outlined in the initial problem statement. Through meticulous data analysis and visualization, we have effectively addressed the primary aim of creating an intuitive and interactive dashboard for vehicle financing portfolios. Our dashboard not only provides a unified view of key financial metrics but also supports advanced analytics and enables real-time monitoring of portfolio performance. Each insight gained, from the stability of loan approval rates to the distribution of approved loans by borrower demographics, serves to support data-driven decision-making and effective portfolio management.

4.3.1. *Alignment with Key Financial Metrics*: The insights provided by the dashboard, such as the loan approval rate stability, distribution of approved loans by age group, and analysis of delinquency rates based on previous default status, directly address key financial metrics relevant to portfolio performance and risk management.

4.3.2. *Support for Advanced Analytics*: The dashboard facilitates advanced analytics by presenting comprehensive data analysis and visualizations that enable deeper insights into portfolio trends, borrower behaviour, and risk factors. For example, the analysis of loan approval rates by tenure length and borrower characteristics provides actionable insights for data-driven decision-making.

4.3.3. *Facilitation of Data-driven Decision-making:* By offering insights into borrower demographics, risk factors, and portfolio dynamics, the dashboard empowers stakeholders to make informed decisions regarding credit underwriting, loan pricing, and portfolio management strategies. The insights gained from the dashboard support data-driven decision-making processes aimed at optimizing portfolio performance and minimizing risk exposure.

4.3.4. *User-friendly interface:* The dashboard's intuitive and interactive design enhances user experience and facilitates easy navigation and exploration of data. Stakeholders can quickly access irrelevant information and drill down into specific metrics or trends to gain deeper insights into portfolio performance and risk factors.

4.4. Comparison with Literature

Our project, creating an intuitive performance dashboard for vehicle financing portfolios, echoes themes found in existing literature. Like the Power BI-Based Dashboard project from Indonesia, we emphasize data analytics for industry challenges. However, our focus on real-time monitoring of financial metrics within vehicle financing portfolios sets us apart. While not directly addressing COVID-19 impacts like the Indian Automobile Industry study, our project underscores agility and adaptability in dynamic markets. By offering insights for strategic decision-making, we contribute to industry innovation, aligning with broader goals outlined in literature on automotive finance.

CHAPTER 5: CONCLUSIONS AND FUTURE RECOMMENDATIONS

5.1. Summary of Key Findings

5.1.1. *Overview:* The project offers insights into portfolio management, risk assessment, and industry trends within automotive finance. We find metrics such as total number of customers, portfolio growth, portfolio yield, loan approval rate, etc.

5.1.2. *Key metrics:* Uttar Pradesh and Maharashtra had the highest amount of debt. The age group most eligible for future loans is 36-45. Understanding customer credit utilization patterns aids in risk assessment.

5.1.3. *Risk Analysis:* Risk analysis identifies trends such as customers lacking ID proof obtaining significant loan amounts and segregation of customers based on loan default and account history. These insights help in identifying high-risk borrowers and informing risk mitigation strategies.

5.1.4. *Benchmarking*: Benchmarking comparisons reveal insights into customer behavior, loan profitability, and credit utilization patterns. Understanding trends such as loan tenure, credit history, and portfolio yield aids in strategic decision-making within the automotive finance industry.

5.2. Achievement of Objectives

Based on the objectives outlined for the project, here's how we accomplished each objective:

5.2.1. Primary Objectives
5.2.1.1. *Interactive Visualizations:* We achieved this objective by developing real-time analytics and interactive visualizations within the dashboard. These features allow finance professionals to dynamically explore and analyze complex financial data, supporting data-driven decision-making and operational efficiency.

5.2.1.2. *Portfolio Management:* Our dashboard provides finance professionals with the tools necessary to streamline portfolio management. By offering a unified platform for managing complex financial data, we

enable professionals to efficiently track and monitor portfolio performance, reducing errors and saving time.

5.2.1.3. *Risk Management:* Through the dashboard's interactive features, finance professionals can assess credit risk, track delinquency rates, and identify high-risk accounts for proactive risk mitigation. This supports effective risk management practices, reducing the likelihood of loan defaults and promoting financial stability.

5.2.2. Secondary Objectives

5.2.2.1. *Competitive Advantage:* By enabling companies to adapt to changing market conditions and stay ahead of competitors, our dashboard provides a competitive advantage. The real-time analytics and benchmarking capabilities empower companies to make informed decisions and respond quickly to market dynamics.

5.2.2.2. *Benchmarking:* Our dashboard supports strategic planning and performance evaluation by allowing automotive finance companies to compare their performance with industry peers. This benchmarking functionality provides valuable insights for identifying areas of strength and opportunities for improvement, contributing to strategic decision-making.

5.2.2.3. *Portfolio Health:* The proactive approach to portfolio health promoted by our dashboard enhances operational workflows and facilitates effective risk management. By providing insights into portfolio performance and identifying potential risks, finance professionals can take proactive measures to maintain portfolio health and optimize financial outcomes.

5.3. Future Research and Improvements

Future research for this project is crucial to enhance predictive capabilities, address emerging challenges, and optimize user experience, ensuring its ongoing effectiveness and relevance in automotive finance. There are various improvements or features that can be implemented to enhance the effectiveness of this dashboard, and drive data-driven decisions.

5.3.1. Advanced Predictive Analysis
Advanced predictive analytics models can be used to forecast delinquency rates, identify early warning signals for potential defaults, and optimize loan approval processes. This could involve leveraging machine learning algorithms to analyze historical data and predict future trends in borrower behavior.

5.3.2. Personalized Financial Insights
Recommendations for individual borrowers can be developed based on their credit history, financial behavior, and life events. This could involve implementing advanced segmentation techniques and algorithmic decision-making to tailor loan offerings and support financial wellness initiatives.

5.3.3. Fraud Detection
Anomaly detection techniques and transaction monitoring algorithms can be used to detect fraudulent behavior and identify suspicious patterns as it occurs and take immediate action to mitigate risks.

5.3.4. Mobile Accessibility and User Experience
The accessibility and user experience of the dashboard can be enhanced by developing mobile-friendly interfaces and intuitive navigation features.

5.4. Final Thoughts and Implications

The project holds significant promise in revolutionizing the landscape of automotive finance by providing a unified platform for managing complex financial data and supporting swift, accurate analysis. Its interactive features contribute to effective risk management, empowering finance professionals to assess credit risk, track delinquency rates, and identify high-risk accounts for proactive risk mitigation. By streamlining portfolio management and offering real-time analytics, the project enhances operational efficiency and decision-making processes within automotive finance companies. Moreover, its benchmarking capabilities enable companies to compare their performance with industry peers, fostering a competitive edge and 26acilitateng strategic planning. With further research and improvements, the project has the potential to drive innovation, address emerging challenges, and optimize portfolio health, ultimately leading to improved financial outcomes and customer satisfaction in the automotive finance industry.

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